

A National Training Center Rotation — In the Field

I guess in the public mind soldiers still appear in parades, but out here there aren't any parades, and the battlefield is a very lonely place.

—Brig. Gen. Wesley K. Clark

NTC Commander, October 1989-September 1991

The Framework

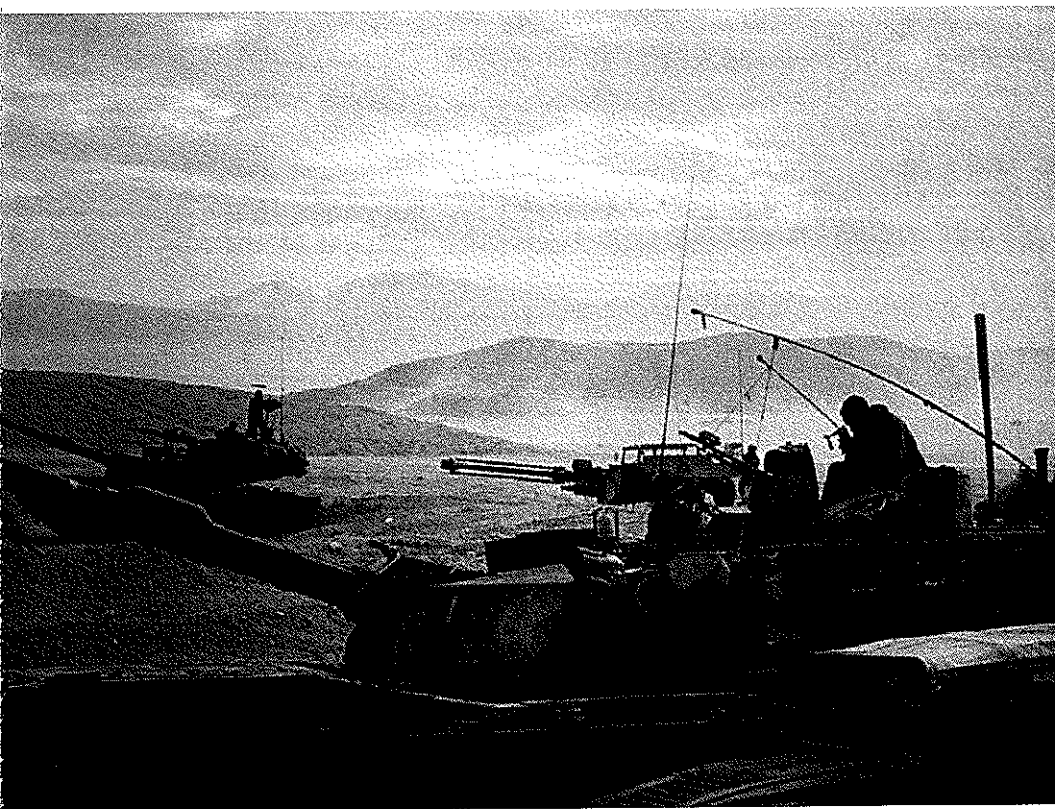
In possession of equipment and weapons capable of recording the action on the battlefield, rotating units headed into the desert for fourteen days of what many soldiers and leaders considered to be the most demanding training offered anywhere. Upon arriving in the field, units' activities centered around the three "pillars" of the NTC: the sophisticated tracking and laser engagement system controlled and monitored by the TRADOC Operations Group; the permanently stationed opposing force (OPFOR) that acted as a "sparring partner" for the soldiers that rotated through the NTC; and the expert observer/controllers (O/Cs) who controlled and monitored training activities in the field and from the Operations Center at Fort Irwin and who were responsible for the all important after action reviews (AARs). Unit personnel would also encounter intense heat or cold, the ever-present dust, smoke, wire obstacles, simulated mines, and chemical effects. U.S. Air Force fixed wing aircraft flew close air support sorties. In short, all the elements of modern land warfare consistent with safety and possible in the absence of actual fear of injury or death, were present on the NTC battlefield.

To establish the parameters for the exercises, commanders and their staffs were armed with information and documents received at Fort Irwin or at home station. Those included the rules of engagement, the mission plan, the area of exercise engagement, operations orders, logistics procedures, the exercise scenario, and safety regulations.

The rules of engagement, or ROE, established the basic guidelines for the conduct of training at the NTC. Units were expected to be familiar with the ROE prior to deployment to Fort Irwin. Once there, the observer/controllers (O/C) briefed and clarified the rules to unit leaders. The ROE represented the official parameters under which operations at the NTC would be conducted, and all units were required to adhere to them. The rules also were designed to allow the trainers to safely control the exercises while permitting maximum freedom of operations and battlefield realism. Rules



Smoke and dust partially obscure the rugged terrain as a UH-1 "Huey," visually modified as a Soviet HIND, flies past a 4th Infantry Division M113 armored personnel carrier.



Under NTC Rules of Engagement when a vehicle was "killed," its turrets had to be transversed to the rear. The crews of 3d Armored Cavalry Regiment M1A1 main battle tanks await the end of the battle.

of engagement were established for both the BLUFOR and OPFOR and included such instructions as limits in maneuver areas and what vehicles were to do when they were destroyed in the simulation.¹

Units planning a visit to the NTC had a choice of missions. Approximately 120 days prior to the rotation, the brigade commander made a written request to the TRADOC Operations Group for the missions he would like his unit to conduct, based usually on the unit's mission essential task list (METL). The METL defined the collective training skills the unit needed to train, based on the operational or contingency plans they had been ordered to respond to by the Army. Guided by the commander's request, the

1. NTC Operations Group, "Rules of Engagement," (Fort Irwin, Calif., October 1987) [hereafter cited as ROE].

Operations Group built a scenario to guide the training. No matter how many times a unit trained at the NTC, the scenario was always different.²

As noted earlier, the major objective of NTC planners and developers was to create as realistic a battlefield environment as possible. To the extent that the training offered at the NTC was considered "unrealistic" by some soldiers and officers, the reason for the lack of realism was usually related to safety concerns. Safety was a top priority with NTC officials with regard to rotating troops, field trainers, and visitors. While deaths and serious injuries did occur, by and large—given the thousands of soldiers trained there annually and the nature of the training—the NTC's safety record was considered good. From January 1982, when the first full-scale exercises were conducted at the NTC, through December 1993, the NTC Safety Office reported 55 training related deaths (30 ground, 7 parachute drop, and 18 aviation). The average casualty rate through July 1993 was reported as 3.52 "military disabling injuries" per 1,000 soldiers.³ The emphasis on safety was driven not only by prevention of accidents during training exercises but on the reduction of non-battle losses during actual combat. To those ends, the TRADOC commanding general and the chief of staff directed that force protection be made a part of O/C training at all three combat maneuver training centers.⁴ Many of the safety regulations at Fort Irwin, however, were a response to the vast spaces, the rugged terrain, and the temperature extremes in the high desert.⁵

Some safety rules applied specifically to dismounted infantry operations. At no time were soldiers to patrol singly on the NTC battlefield. Although the rules of engagement required a dismounted "casualty" to remove his helmet, sit down, and cease play, he was authorized to move to safer ground if there was danger to him from vehicles involved in the battle. And at no time were casualties to be left on the battlefield. Individual soldiers, once declared out of the battle, were to follow along behind the main body of troops until such a time as there were a minimum of three

2. Briefing, Brig. Gen. William G. Carter III, 10 Feb 92, Fort Irwin, Calif.

3. Fatalities information provided by Safety Office at the NTC on 12 January 1995 through the TRADOC Command Safety Office. Casualty figures are in MFR CSSC-PMG/PR, U.S. Army Safety Center, Fort Rucker, Ala. to George Morgan, Safety Director, TRADOC, 13 Jul 93, subj: Force Protection (Safety) Assessment at the National Training Center.

4. Msg, Cdr TRADOC to Cdr CAC, 082238 Feb 93, subj: Force Protection at the CTCs.

5. The NTC safety guidance from the Rules of Engagement and the "NTC Safety Guidance for Rotational Units" publication are covered at length in Center for Army Lessons Learned Newsletter No. 93-9, Force Protection (Safety), (Fort Leavenworth, Ks., U.S. Army Combined Arms Command, December 1993).

casualties. At that time, the casualties were to sit down together and await evacuation. At no time would all the soldiers in a group of casualties sleep. A minimum of one soldier would remain awake and standing in order to signal the presence of the dismounted troops to armored vehicles. Unit commanders were responsible for carefully marking sleeping positions. In addition, dismounted infantry were forbidden to come closer than 50 meters to an enemy armored vehicle, in part because the Hoffman charges used to simulate the firing of the main gun were dangerous to 50 meters. Advancing armored vehicles that charged enemy dismounted positions, thereby creating a safety hazard, could be declared "killed" by the observer/controllers.⁶

Other rules applied to tracked and wheeled vehicles and aircraft. Vehicle speeds were limited to 20 miles per hour in cross country driving in daylight. Speed limits in darkness were even slower. In assembly areas, speed was limited to 5 miles per hour and ground guides were obligatory. During a battle, engagements between vehicles were not allowed closer than 50 meters. If a target appeared at less than 50 meters, the driver and tank commander were to stop the vehicles and cross their arms over their face to signify that they were engaging. The O/Cs then decided the outcome of the confrontation. When aircraft were involved in the battle and electronic airborne jammers were in use, the aircrew or forward air controller made a safety call to terminate jamming in the event of an emergency or a hazardous situation. After exercise controllers assessed an aircraft as killed, further tactical radio calls ceased but safety and flight-related calls continued.⁷

Safety rules also included warnings about climate and terrain related hazards. To avoid heat injuries, commanders informed soldiers they should drink 10-12 quarts of water per day. They were also warned against sleeping in closed vehicles with engines or heaters operating. Flash floods were a serious threat and soldiers were not to park, sleep, or remain in wadis or ravines during wet weather. Lastly, it was so deceptively easy to get lost in the desert that the soldiers had a term for it, LID, lost in desert. They were to remain with their vehicle until located. If LID at night, soldiers were to stop and wait for daylight before attempting to identify their position.⁸

6. (1) ROE, pp. 13-15. (2) Maj. Mike Galloucis, "Leadership Notes to Myself," *Army*, December 1992, pp. 28-32. The antitank MILES, in any case, was ineffective within 50 meters because of insufficient laser beam spread.

7. Rules of Engagement, pp. 5, 12, 52, 55.

8. ROE, pp. 52-53, 55.



Avoiding "LID." A soldier of the 1st Cavalry Division checks his maps, not wishing to fall victim to "lost in desert" syndrome. The MILES laser detection devices are clearly visible.

Each battalion task force participated in approximately six force-on-force exercises during their two weeks in the field. The exercises were more or less evenly divided between offensive and defensive operations. During a typical rotation, a unit would participate in a variety of missions including movement to contact, hasty attack, deliberate attack, defend in sector, and defend from a battle position. Scenario writers in the Operations Group created the continuous scenario based on a unit's mission essential task list (METL), wartime missions, past performance at the NTC, and the number of times the commanders had been to the training center. In addition to force-on-force training, units also performed three missions on the live-fire range during their rotations. Live-fire exercises are discussed below.⁹

The number of rotations hosted at the NTC annually through 1989 varied according to policy or funding. Beginning in FY 1990, the number of rotations was set at twelve per year. As of December 1993, the NTC had conducted 140 rotations. Fort Irwin and the NTC had been a temporary home to more than half a million soldiers, approximately 140,000 noncommissioned officers, and 38,000 officers. As noted above, each 28-day rotation cycle included 14 days of force-on-force maneuvers and seven days each for equipment draw and equipment turn in. The 14-day combat cycle was broken into two phases. In the first phase, one of the two task forces spent 5 days at live-fire training while the other conducted force-on-force exercises. The two units then exchanged places for 5 additional days. The remainder of the time was spent with both task forces in force-on-force training.¹⁰

Units came to the NTC from each U.S. Army division, separate brigade, and armored cavalry regiment in the continental United States. Because Army doctrine required combined arms and services teamwork, the goal was for each task force organization to mirror wartime task organization to the greatest extent possible. Doctrine also required that the maneuver commander integrate combat, combat support, and combat service support units and systems. Thus, the 4,000-5,000 soldiers training at the NTC during each rotation represented infantry, armor, artillery, aviation, chemical, logistics, air defense, engineering, military police, electronic warfare, and intelligence units. Given this mixture, it was no wonder task force

9. (1) William L. Shackelford, *A Method of Analysis for the Bradley Fighting Vehicle System*, BDM for ARI, January 1987. In that study, Col. (Ret.) Shackelford described in detail the standard missions conducted at the NTC. (2) Specialist Galen Wiering, "A Diamond in the Rough," *Army Research, Development & Acquisition Bulletin*, March-April 1992, pp. 18-21.

10. Wiering, p. 18.

commanders frequently remarked about the "incredible" differences in procedure and jargon that prevailed. In addition, support elements were not always familiar with the maneuver units they were assigned to support. Most often the maneuver unit commander was not the actual commander of the support elements.¹¹

For the task force scheduled first for force-on-force maneuvers, field training began with a long road march to the field. First-time visitors to the NTC were usually surprised by the busy atmosphere at the assembly areas and on the battlefield. A battalion commander and NTC veteran recorded his impressions:

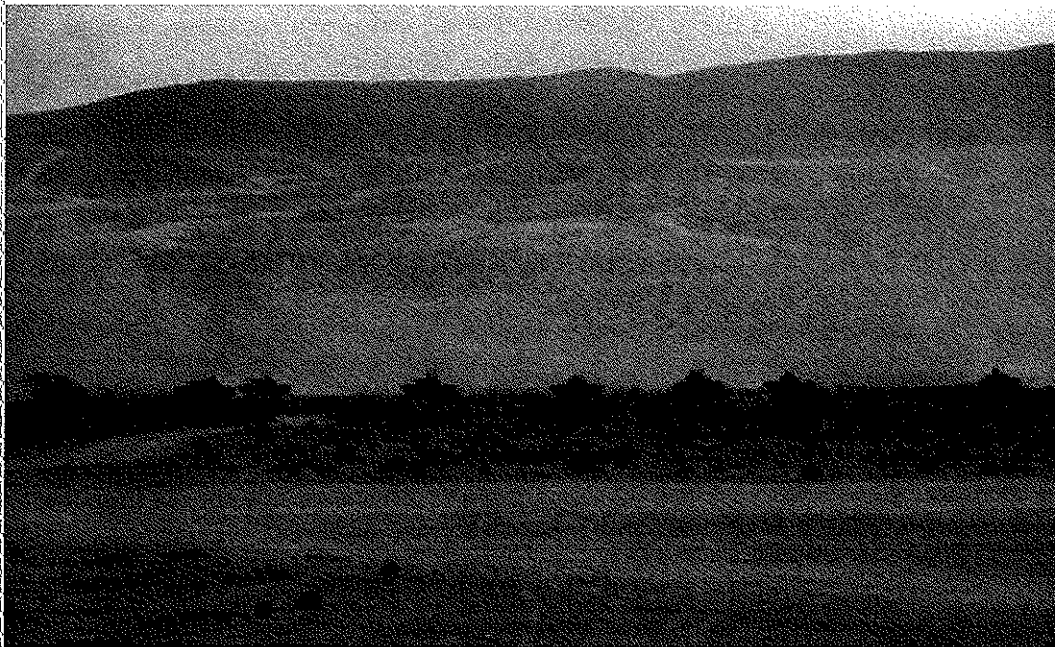
Way out in the distance you will notice a first sergeant leading his logistics pack (LOGPAC) from the trains area. To your right you will see a maintenance collection point in operation. Further to your right some leaders are performing a recon [reconnaissance] for their next operation and beyond them you see some engineers at work on a tank ditch. Way over to your left a mechanized infantry unit is setting in hasty protective minefields and beyond them you spot a tank platoon reboresighting its MILES. In short, it is one hell of a busy place with extraordinary distances between activities.¹²

The terrain and climate at Fort Irwin were discussed at some length in Volume I. For the first-time visitor, both the terrain and climate served to reinforce the imposing NTC mystique. The training area consisted of open desert terrain divided up by three roughly parallel mountain ranges to form several large valleys. Some of the valleys merged at narrow gaps and some merged in moderately wide areas.¹³ The ground was predominately hard-packed with only sparse vegetation. The bare, rocky mountains—the most imposing of which was 5,100-foot Tiefert Mountain—rose up sharply from the desert floor. Large scale force-on-force movement occurred in the wide valleys and through the gaps in the mountains. Battles took place in places with names like the

11. (1) FM 25-100, *Training the Force*, November 1988. (2) Wiering, p. 18. Supporting elements' leaders received their efficiency reports from their own parent unit commander and not the maneuver commander.

12. Cocks, p. 10. LOGPACS (logistics packages) and the MILES are discussed below.

13. Only 219,914 acres of Fort Irwin's total of 635,052 acres was used for maneuvers. The main post area contained 2,500 acres; off-limits areas accounted for 191,094; and artillery impact areas and mountain ranges contained 221,544 acres. NTC Visitor Book, Rotation 94-7, April 1994.



A column of armored VISMODOs is silhouetted against Fort Irwin's Granite Mountains.

Valley of Death, John Wayne Pass, Whale Gap, and Porto Potty Wadi. One of the first things rotating units observed was the great difficulty in accurately gauging distances on the ground—an experience that would serve many of them well during the Persian Gulf War in 1990-1991. As noted above, another thing soldiers rapidly learned was that—despite the celebrated map-reading skills of soldiers over the history of the U.S. Army—it was easy to get lost in the Mojave Desert.¹⁴ One veteran of the NTC observed that “many amusing hours have been spent at the CIS [Core Instrumentation Subsystem] . . . by the observer controllers watching the display screen depicting a vehicle, totally lost, driving around in circles in the desert.” The climate, too, often contributed to a unit’s woes. The climate at Fort Irwin could become very cold at night.¹⁵ When one airborne unit arrived at the desert base without thermal field jacket liners, the temperature dropped rapidly, and the lightly clothed

14. Of Fort Irwin’s 640,000 acres, approximately 430,000 acres was trafficable by tracked vehicles.

15. The average low temperature in winter is 36 degrees; the average high temperature in summer is 105 degrees, although temperatures approaching 130 degrees have been recorded. Dwight J. Goehring, ed., *ARI-NTC Data Archive and Research Center Workshop Notebook*, (Office, Deputy Chief of Staff for Personnel, Department of the Army, October 1989), pp. 25-26.

troops surrendered in platoons. That, then, was the setting for fourteen days of very demanding training at Fort Irwin for U.S. Army troops.¹⁶

The Weapons of the NTC

Accompanying the BLUFOR to the maneuver areas were a myriad of weapons systems and hundreds of pieces of equipment, some of which had been in the U.S. Army inventory for some time and others that had only recently been fielded. As noted earlier, weapons and equipment at the NTC were a mixture of that prepositioned at Fort Irwin and that brought by units



Side by side, two major products of the U. S. Army's weapons modernization program of the 1970s and 1980s. The M1A1 (right) was an improved version of the M1 Abrams MBT. The M2-series Bradley Infantry Fighting Vehicle (left) was considered the key to the Army's mechanized infantry doctrine.

16. (1) Cocks, p. 7. (2) Nolan B. Young, "Using the Global Positioning System (GPS) to Fulfill the Position/Location Requirements of the National Training Center (NTC) and Other U.S. Army Instrumented Testing and Training Ranges" (Thesis, Naval Postgraduate School, Monterey, California, March 1991), p. 57. (3) Michael Woodgerd, "If You Don't Like This, You May Resign and Go Home: Commanders' Considerations in Assaulting a Fortified Position," (Thesis, Naval Postgraduate School, Monterey, California, March 1991), p. 159. (4) Quinn G. Johnson, "They All Hate the Bad Guys of NTC's Mojave," *Army*, June 1987, p. 45.

from home station. Dominating the scene were a miscellany of vehicles, both wheeled and tracked. Perhaps most prominent on the battlefield were the 60- to 70-ton M1 Abrams main battle tanks¹⁷ and the M2/M3 Bradley Fighting Vehicles, two of the "big five" weapons systems that formed the backbone of the U.S. Army's force modernization program. The tracked Bradley infantry and cavalry fighting vehicles had been fielded at the NTC in October 1988. The latest upgrade of the M1 tank, the M1A2, was field-tested at the NTC in July 1993. At this writing, there were only a few of the technologically advanced M1A2 Abrams tanks at the NTC, although there were many of the earlier versions of the M1-series. In the mid-to-late 1980s, tanks of the M60-series, which traced its lineage and basic design to the M26 Pershing of World War II, could still be seen on the NTC battlefield. By 1993, all the older tanks had been replaced with the M1 or M1A1.



This M1 MBT was representative of the first version of the M1 first fielded in 1980 and named for Army Chief of Staff General Creighton W. Abrams, Jr. The M1 had a 105-mm. rifled main gun which was replaced in subsequent models with the 120mm. smooth-bore cannon.

17. The newest M1-series tanks weighed 70 tons. Some of the M1s fielded earlier weighed approximately 60 tons.



Two Bradley Fighting Vehicles in the lead of a column of M1 main battle tanks as the BLUFOR prepares to engage the OPFOR.

This Bradley Fighting Vehicle at speed had a three-man crew and could transport six soldiers. The vehicle mounted a 25-mm. "chain gun."





The M1A1 Abrams main battle tank with its improved armor, 120-mm. main gun and NBC protection had a distinct advantage over the older M1. Thermal imaging systems allowed BLUFOR units readily to target the OPFOR through dust, smoke, and darkness.



There were a few upgraded M1A2 MBTs at the NTC at the close of 1993. This vehicle belonged to the 1st Cavalry Division.

Perhaps the most prevalent armored vehicle at Fort Irwin was the M113 armored personnel carrier. The M113 family of vehicles had a myriad of derivatives and many variants. Long a standard carrier for mechanized infantry units, the various M113 configurations also served as cargo carriers, recovery vehicles, ambulances, command posts, fire support team vehicles, and as platforms for such weapons as mortars, the Chaparral surface-to-air missile, the Vulcan air defense system, and the improved TOW vehicle.¹⁸

If the NTC was "tank country" as General Richardson had claimed, it was also anti-tank country. The anti-tank inventory included the TOW heavy, long-range missile which was mounted on its own TOW vehicle or on Bradley Fighting Vehicles, HMMWVs (high mobility, multipurpose wheeled vehicles), or AH-1 Cobra helicopters. Infantry units used a man-portable version of the TOW with a tripod mount. Some task forces employed the Dragon infantry anti-tank missile, a medium-range complement to the TOW. For use against lightly armored targets there was the shoulder-fired AT-4, a lightweight (14.6 lb.) anti-tank rocket used at the infantry squad level. One of the most familiar, and most accurate, antitank weapons at the NTC was the Hellfire, a laser-guided missile, widely regarded as the most advanced such weapon in the Army inventory. Beginning in the early 1990s, units increasingly deployed to Fort Irwin with the Copperhead, a cannon-launched guided projectile. The Copperhead was fired in close proximity to a target and guided to the target by laser illumination from scout helicopters or forward observers on the ground.¹⁹

The aforementioned Dragon was a source of frequent complaint at the NTC among the visiting BLUFOR. The weapon was cumbersome to carry on one's back, and when fired sent up a highly visible plume of white smoke that was often easily spotted in the desert. Worse, the weapon's crosshairs had to be kept steadily on the target tank for 15 to 20 seconds. Meanwhile, it only required about 4 seconds for a Soviet T72 to spot and fire on the Dragon gunner. In addition, flight over some obstacles tended to

18. This section on the weapons of the NTC battlefield is based on one or more of the following: (1) CAA Report, p. 16. (2) Tom Clancy, *Armored Cav: A Guided Tour of an Armored Cavalry Regiment* (New York: Berkeley Books, 1994), p. 58. The Clancy book contains descriptions of all the U.S. Army's major vehicle, artillery, aviation, and man-portable systems. (3) Ripley, pp. 22-29, 34-39. (4) "Army Weaponry and Equipment", *Army*, October 1984-October 1993, passim. The Army "Green Book" published each October, contains updated descriptions of Army weapons, equipment, and navigational systems. (5) Greg Stewart, *National Training Center: Ultimate in Land Warfare Training* (Hong Kong: Concord Publications Company, 1992).

19. Ripley, pp. 114-120.

interfere with the trailing wire that provided the missile's guidance system. A replacement for the Dragon, known as the Advanced Antitank Weapons System-Medium (AAWS-M) (later renamed the Javelin) was under development at the close of 1993.²⁰

The third dimension of the battlefield at the National Training Center was represented by a variety of U.S. Army helicopters and U.S. Air Force fixed wing aircraft. The AH-64 Apache attack helicopter, armed with Hellfire antiarmor missiles, provided the BLUFOR the capability to fly and fight at night and in bad weather. The older AH-1 Cobra helicopter, which had seen extensive service in Vietnam, supplied additional attack capability. The OH-58 Kiowa light observation helicopter, the newer models of which could fire the Stinger air-to-air missile and featured mounts for



The AH-64 Apache attack helicopters flew simulated combat missions at the NTC to afford the brigade ground commander mobility and maneuverability. This Apache is shown at a forward area rearming and refueling point.

20. George C. Willson, "In Mock Combat 'Soviets' Win Again and Again," *Washington Post*, 22 Feb 88. The AAWS-M, or Javelin, development was part of a larger program to develop a "heavy" replacement for the TOW and a "light" replacement for the AT-4. "U.S. Army Weaponry," *Army*, October 1991, pp. 276-78.



A CH-47D Chinook medium transport helicopter supports BLUFOR engineers. The Chinook's main cabin could accommodate between 33 and 55 combat equipped troops. The helicopter's cargo bay could carry up to a 24,000-pound payload.

Hellfire antitank missiles, served as reconnaissance aircraft for attack, air cavalry, and artillery units. The UH-60 Black Hawk utility tactical transport helicopter, designed to carry a squad of eleven and a crew of three, could transport up to 8,000 pounds of cargo slung externally beneath the fuselage. Another utility helicopter, the UH-1 "Huey," of which the Army had several versions and which also had seen extensive service in Vietnam, provided among other things, casualty evacuation and logistics. At Fort Irwin, the Huey was also visually modified to portray a Soviet HIND-D helicopter.²¹ And, finally, the NTC battlefield featured the CH-47D Chinook helicopter. That medium transport aircraft, which could carry up to

21. The Huey's official name was the Iroquois, but prior to the early 1960s, the Army designated it the UH-1, which gave rise to the name Huey.

fifty-five combat-equipped troops and a payload of up to 24,000 pounds, gave operational commanders the ability to rapidly deploy towed medium howitzers, and large numbers of troops and to supply them by air with fuel, ammunition, and equipment.

In addition to Army helicopters, U.S. Air Force fixed wing aircraft also supported combined arms training at the NTC. To provide close air support (CAS) to both the BLUFOR and the OPFOR, the Air Force employed A-10 Thunderbolt II "Warthogs," F-16 Fighting Falcons, and Army National Guard F-4 Phantoms and A-7 "Corsairs." The A-10 was the only U.S. Air Force aircraft ever designed with the exclusive mission of close air support of ground forces. The A-10 was primarily a daytime, VFR (visual flight rules) aircraft which had limited use in adverse weather. Like the A-10, the lightweight F-16 fighter was a single seat aircraft agile enough to dogfight and powerful enough to carry a heavy bomb load. The aging F-4 had been a mainstay of the Air Force, Navy, and Marine Corps for at least two decades. At the NTC, different types of aircraft supported each of the BLUFOR and OPFOR forces. OPFOR air support and the continuing role of the USAF at the NTC are discussed below. In addition to piloted vehicles, NTC battles sometimes featured unmanned aerial vehicles (UAV) known as the Pointer. The small, remotely piloted aircraft, which the U.S. Army had begun acquiring from Israel in the late 1980s, was an interim short-range system that featured a 10-foot wing span and was used for battlefield surveillance and artillery target spotting.²²

Despite a number of difficulties in recording the effects of ground-to-air engagements, air defense artillery (ADA) systems also played a role at the NTC. The Chaparral, a forward area air defense system (FAADS) was a surface-to-air missile designed to provide low altitude air defense. A refinement to the air-to-air Sidewinder, Chaparral had a heat-seeking guidance system. The Chaparral was usually deployed in company with another ADA system known as the Vulcan. The Vulcan was the standard light anti-aircraft gun of the U.S. Army and came in two versions featuring a 20-mm. gatling gun, towed or self-propelled. As noted earlier, the self-propelled Vulcan was mounted on a modified M113A1 chassis. Like the Chaparral, the Vulcan was originally developed as an air-to-air weapons system. Although the Vulcan gun was outclassed by similar German and Soviet systems, economy moves and the failure of the 40-mm. Sergeant York ADA system project meant that it was likely to remain a mainstay of U.S. Army forces for many more years.

22. (1) *Weapons of Desert Storm* (Signet Special Publications), pp. 10, 19, 27. (2) Ripley, pp. 88-91. The objective UAV system, the Hunter, was still under development at the end of 1993.

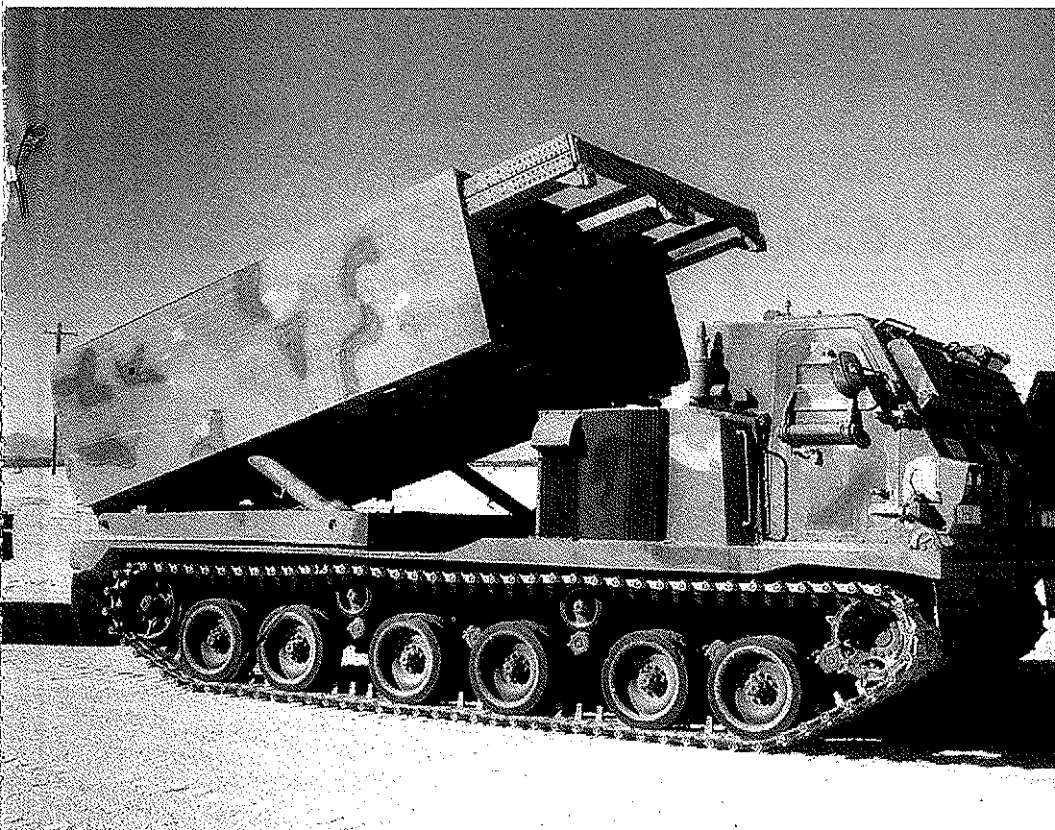
One of the most visible weapons on the NTC battlefield was the man-portable Stinger air defense missile. A replacement for the Redeye shoulder-fired surface-to-air missile, the lightweight Stinger featured an "Identification Friend or Foe" (IFF) system so that the operator did not have to rely on visual identification of oncoming aircraft. In addition to the shoulder-fired version, the Stinger could be mounted on a number of helicopters and fighting vehicles. Another Stinger carrier was the relatively new Avenger, a HMMWV with a compact electrically driven turret platform that mounted eight Stinger missiles, a .50-caliber machine gun, and a digital fire control system.²³

Some artillery units arrived at the National Training Center with the Multiple Launch Rocket System, or MLRS. The MLRS was designed



The M109 155-mm. self-propelled howitzers were the standard field artillery pieces in mechanized divisions. Like this gun issued to the 4th Infantry Division during an NTC rotation the M109 had an elevation of +75 and a turret that could be transversed through a full 360 degrees.

23. (1) Ripley, pp. 102-113. (2) *Weapons of Desert Storm*. (3) Scott R. Gourley, "Avenger Air Defense System," *Army*, March 1996, pp. 54-55.

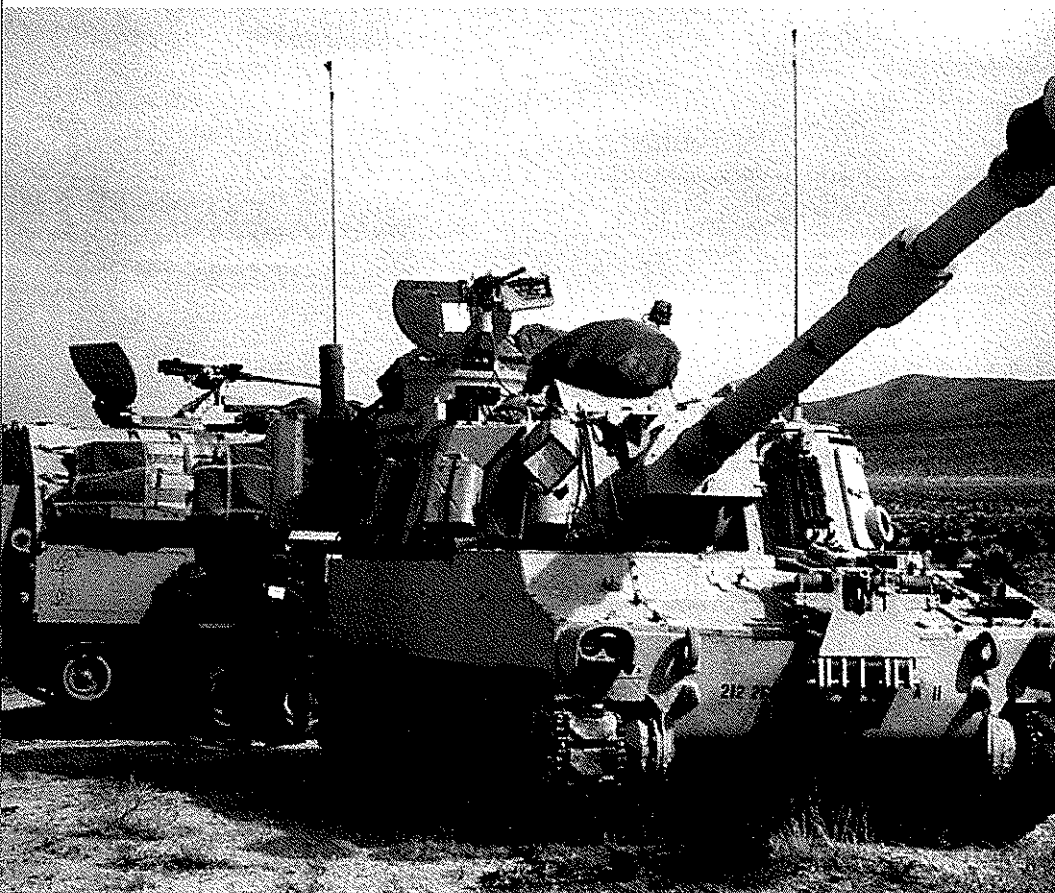


Although not usually fired at Fort Irwin, the Multiple Launch Rocket System (MLRS) was occasionally brought to the NTC by MLRS batteries. Here, the free flight artillery rocket system has just been unloaded from a railcar at the Manix siding.

to strike far into the rear of armored forces, and although not usually fired at the NTC because of its range and lethality, its presence added realism to the maneuvers of heavy forces. The MLRS launcher was built on an M2 Bradley Infantry Fighting Vehicle chassis and featured a computerized aim and control system. The weapon was capable of launching from one to twelve rockets in one minute to a range of eighteen miles.²⁴

Task forces engaging in force-on-force maneuvers and live-fire exercises at Fort Irwin employed a variety of fire support systems. Perhaps one of the most recognizable systems was the M109 155-mm. self-propelled

24. *Weapons of Desert Storm*, p. 64.



The M109A3 self-propelled 155-mm. howitzer was one of the most recognizable BLUFOR fire support systems at the NTC. In the background is an M54A ammunition resupply vehicle.

howitzer, the standard field artillery piece in mechanized divisions. Until 1993, the M109A2/A3 was the most advanced version in use. Early in 1993, the Army fielded the improved M109A6, better known as the Paladin. During Rotation 93-06 at the NTC, the only four production models of the Army's newest medium artillery piece in use by a unit were tested during live-fire exercises. The Paladin, also self-propelled, featured a new cannon with a range of approximately 30,000 meters, an onboard ballistic computer and navigation system, night vision capability, and an improved NBC system. The new Paladin allowed crews to complete a fire mission in five minutes without exiting the vehicle. The older models required up to twenty

minutes and crews had to leave the vehicle to determine location and unlock the gun.²⁵

The M119 105-mm. light artillery howitzers (towed) were increasingly seen at the National Training Center. The M119 was an American made copy of the British-built L119 Light Gun designed to replace the aging M102. The M119 was designed to improve fire support for the Army's airborne, air assault, and light infantry divisions and separate brigades. Fielded first with the 7th Infantry Division, the M119 would eventually replace the M102 in the active force. The M119's prime mover was the High Mobility Multipurpose Wheeled Vehicle (HMMWV), discussed below.²⁶

A variety of mortars were employed at the NTC and were the only major fire support asset under the battalion commander's direct command. Many commanders considered mortars ideal weapons for the infantry, because they provided a means of bringing heavy fire to bear quickly, and they were lightweight and relatively simple to operate. A number of senior U.S. Army officials, however, expressed concern that mortars were not being employed as often or as effectively as doctrine called for. Whatever the case, most dismounted infantry possessed mortars, most notably the thirty-year-old 81-mm. M29, the standard medium mortar of the U.S. Army which was in service in two basic models, infantry and self-propelled. The standard infantry model could be broken down into three components, each of which could be carried by one man. In dismounted infantry, airmobile, and airborne units at company level, the M29 was gradually being replaced by the much lighter 60-mm. M224.²⁷

A relatively new arrival to the NTC battlefield was the German-designed XM93 Fox (Fuchs) NBC armored reconnaissance vehicle. The wheeled vehicle was specifically designed to detect, identify, and mark areas of NBC contamination while transmitting NBC warning information to higher commanders. A system of scoops and air locks allowed the crew to collect soil, water, and vegetation samples without leaving the vehicle.

Also occasionally present in the mid-1980s during force-on-force maneuvers was a small fleet of actual Soviet and Warsaw Pact vehicles and weapons. Those involved T-72 and T-80 tanks, BMP-series fighting vehicles, and BRDM-series reconnaissance vehicles. After the Gulf War of

25. SFC Marsha T. B. Eddy, "Paladin Excels in the Desert," *Army Trainer*, Winter 1993, p. 19. (2) Ripley, p. 52.

26. Ripley, p. 60.

27. Ripley, pp. 100-101.



This infantry 81-mm. M29 mortar crew prepares to defend its position from an OPFOR attack.

1990-1991, some Iraqi vehicles of Soviet manufacture were added to the collection. At the NTC, the Soviet and Iraqi collection was the responsibility of the Foreign Materiel Intelligence Company.²⁸

Regardless of the number or type of weapons systems, the backbone of any army was its support vehicles. The U.S. Army had long realized the importance of jeeps and trucks in supplying combat troops with ammunition, food, and other essential supplies and services. The service maintained a massive fleet of trucks, ambulances, and specialist engineering vehicles, among others. The NTC battlefield contained every imaginable type of support vehicle, even armored bridge-laying equipment.

The U.S. Army designated its tactical wheeled vehicles (TWV) as light, under 2 1/2 tons; medium, 2 1/2 to 5 tons; and heavy, more than 5 tons. Each category of vehicle had its own trailer program. Light TWVs at the NTC performed such services as battlefield transportation, communication, medical evacuation, and small unit supply. Some of the light vehicles also served as weapons platforms. Light vehicles ranged from a commercial utility cargo vehicle based on the Chevrolet S-10 and Blazer to the versatile HMMWV.²⁹

The HMMWV, a modern-day successor to the ubiquitous jeep, was a high performance family of vehicles, variously called by U.S. service personnel, the "Hummer" or "Hum-vee." HMMWVs were fielded in a number of configurations for a variety of purposes, including troop and cargo transportation; ammunition movement; medical evacuation; command, control, and communications; and transport for several weapons systems. By 1993, the HMMWV was to be found in almost every unit of the U.S. Army, and had also been modified to fulfill many different requirements for the Marine Corps and Air Force. At the NTC, this workhorse of the wheeled vehicle fleet seemed—like its predecessor—to be everywhere. Some had even been armored to serve as scout vehicles. Others were visually modified (VISMOD) to resemble Soviet BRDMs. As one observer remarked, "the M998 Hummer is to the Jeep what the F-15 is to the Mustang: faster, more powerful, and infinitely more capable."³⁰

28. "U.S. Army Weaponry and Equipment," *Army*, October 1991, p. 232. In the 1970s, for financial reasons, the U.S. Army ceased to field dedicated reconnaissance vehicles. Since that time, the Bradley Infantry and Cavalry Fighting Vehicles, the Abrams tank, and helicopters had served as reconnaissance platforms in armored cavalry regiments and divisional cavalry squadrons.

29. Scott R. Gourley, "A Strategic Force Seeks a Modern Vehicle Fleet," *Army*, August 1993, pp. 28-36.

30. (1) *Ibid.* (2) Ripley, pp. 132-33. (3) *Weapons of Desert Storm* (quotation), p. 59. (4) United States Department of Defense Fact File, April 1993, p. 385. A valuable source for information on the HMMWV is Michael Green, *Hummer: The Combat and Development History of the AM General High Mobility Multipurpose Wheeled Vehicle* (Osceola, Wis.: Motorbooks International Publishers and Wholesalers, 1992).



This HMMWV was visually modified and equipped with a TOW antitank missile to serve as an OPFOR BRDM reconnaissance vehicle.



This 7th Infantry Division (Light) M998 HMMWV was equipped with a mounted TOW missile launcher.

Also very visible at assembly areas and at resupply and reconstitution points were the 2 1/2 and 5 ton trucks of the "medium fleet." Those vehicles and their trailers were employed in the movement of unit equipment and personnel. At the NTC, as elsewhere in the Army, the light medium "deuce and a half trucks" were an aging fleet that was experiencing increasing operating and support costs. Eighty-four percent of the fleet was more than twenty years old by 1993. Many of the heavy medium 5 ton trucks were newer, but in critically short supply.³¹

The heavy fleet of TWV were used at the NTC to transport weapons systems, ammunition, fuel, and other cargo. One of the newest vehicles in the heavy fleet was the Palletized Load System (PLS), a 33-ton payload tractor and trailer combination with demountable cargo flatracks for the distribution of ammunition. The cargo could be loaded and unloaded in five minutes and—given the maneuver-oriented ammunition distribution system at the NTC—the PLS was revolutionizing the delivery of ammunition. Other heavy TWV's were the Heavy Equipment Transporter System, or HETS. The HETS was required to transport, deploy, and evacuate the M1 tank and other tracked vehicles on paved roads, unimproved roads, and, most often at Fort Irwin, cross country. The older fleet of HETS demonstrated very poor durability when loaded beyond 60 tons, and thus were seriously overloaded by the newer M1-series main battle tank. At the end of 1993, the older models were being replaced with a truck and tractor that could transport a 70-ton payload.³² Another prominent heavy vehicle at the NTC was the heavy-expanded mobility tactical truck (HEMTT) which formed the backbone for logistical transportation in armored and mechanized formations. The HEMTT, with its 8 X 8 drive and 10-ton payload capability could transport artillery, ammunition, fuel, water, and other cargo, thereby giving highly mobile forces a significant off-road capability and the ability to supply as far forward as possible.³³

On the rugged terrain at Fort Irwin, the capability to recover combat vehicles from a variety of mishaps was essential. The standard medium armored recovery vehicle was the fifty-six ton tracked M88A1, which was capable of recovering any vehicle on the battlefield except a very badly stuck or damaged Abrams tank. The M88A1 was also used in bulldozing

31. Gourley, pp. 31-34.

32. "U.S. Army Weaponry," *Army*, October 1993, p. 311. Combat-loaded M1 MBTs weighed about 70 tons.

33. (1) Ripley, pp. 142-43. (2) Gourley, pp. 30, 34-35. (3) "U.S. Army Weaponry," *Army*, October 1990, p. 344; October 1991, p. 302.



In the 1980s and early 1990s, the Heavy Expanded Mobility Tactical Truck was the prime mover for U.S. Army logistics in the field. BLUFOR units that did not receive fuel, ammunition, food, or other supplies had to do without.

operations. Newer to the NTC battlefield was the Armored Combat Earthmover (ACE), a combat engineer tractor designed to enable maneuver forces to breach enemy earth obstacles, prepare fighting positions, and create tank ditches. Because the ACE was armored, it could perform those tasks under fire and in close proximity with armored and mechanized infantry forces. NTC battles also featured a variety of forklifts, bulldozers, and other engineer equipment essential to modern warfare. In addition, breaching operations were assisted by the armored vehicle-launched bridge (AVLB) which was mounted on an M60 tank chassis without a turret. The M60 AVLB could rapidly launch a number of different types of bridges that could pass military load class 60 traffic across gaps, i.e., they would take a load of up to 60 tons; however, the AVLB could not easily support a force equipped with 70-ton M1s.³⁴

34. (1) Ripley, p. 134-35, 142. (2) "U.S. Army Weaponry," *Army*, October 1993, p. 311. At this writing an improved M88 recovery vehicle capable of recovering the M1 tank was scheduled to undergo developmental and operational tests beginning in late 1993, with fielding scheduled for 1996. A heavy assault bridge (HAB) mounted on an M1 chassis was also under development with fielding scheduled for FY 1998.



Attacking 155th Armor Brigade elements that survived artillery and air strikes had to breach a massive antitank ditch using the Armored Vehicle Launched Bridge.

At the NTC in late 1994, as elsewhere in the U.S. Army, the M16A2—in several versions—was the standard rifle of the individual soldier. The M16A2 was an improved version of the much-maligned M16A1, which many soldiers and leaders believed to be unreliable, especially at ranges above 300 meters. The controversy, which also centered on the rifle's inability to fire NATO standard 5.56-mm. rounds, was exacerbated by the increased emphasis on training for desert warfare. After a major review of the M16A1 beginning in 1981, the M16A2 went into full-scale production in 1988. Conversion kits for the older M16A1 allowed both versions to fire NATO standard ammunition. The M16A2 was expected to remain the Army's standard rifle until adoption of a new advanced combat rifle around the year 2000.³⁵

Also prevalent on the NTC battlefield were the M60 and M249 machine guns and the M72 Light Anti-Tank Weapon (LAW). The M60 general purpose machine gun was gas-operated and air-cooled, and could be mounted on any one of several types of mounts. The 23-pound gun was

35. (1) "U.S. Army Weaponry," *Army*, October 1990, p. 260. (2) Ripley, pp. 122-23.



The M16 had been synonymous with U. S. Army soldiers since the Vietnam era, and was the standard rifle of the individual soldier. The M16 held by this soldier is equipped with a blank firing device necessary to activate the MILES.

used with a 100-round belt of 7.62 NATO standard ammunition. The M249 squad automatic weapon (SAW) was not as heavy or as sophisticated as the M60, but it had a longer effective range and used 200-round magazines. The SAW was issued two per squad. The LAW, a lightweight (4.75 pounds), disposable, shoulder-fired rocket launcher was the U.S. Army's standard light anti-tank weapon. The M72 provided a key part of an infantry squad's close-in firepower. During the period under study, the LAW was gradually being replaced by the AT-4.³⁶

Those, then, were the major "tools" that units and individuals would employ during their two weeks in the desert maneuver areas at Fort Irwin. It should be clearly understood that the effects of weapons firing during force-on-force maneuvers at the NTC were simulated, and training ammunition or "paper ammo" was employed. Further, not all weapons were instrumented so that their accuracy could be determined and entered into the data base. And not all the weapons systems and equipment discussed above were present on the battlefield during a single rotation, the mixture depending on the units, task force organization, and the scenario. Once again it should be reiterated that in 1993, not all weapons systems were available at Fort Irwin for issue to rotating units. However, plans for the future, as noted in Chapter IV, were to have a "210% prepositioned" fleet for the NTC. That is, 100 percent prepositioned vehicles ready for issue; a like number of vehicles in maintenance; and a 10 percent "float."

Tactical Engagement Simulation—NTC Style

Tactical engagement simulation at the National Training Center depended on five major components: a dedicated opposing force (OPFOR); a centralized and integrated monitoring and data collection system; a laser engagement system to simulate fire and objectively measure casualties; teams of observer/controllers who were experts in their fields; and an after action review process to assess the strengths and weaknesses of units during the training exercises. All of those components were in place by the close of 1984, although some serious deficiencies remained. The most visible and controversial of those deficiencies was the inability to adequately measure the effects of indirect fire discussed in detail later in this chapter. During the next ten years, senior Army officials and NTC personnel, working with the research and development community within and outside of the Army,

36. Ripley, pp. 124, 126, 130.

continued efforts to improve the training environment at the NTC and to ensure that the capstone event of Army training continued to evolve.

The Opposing Force

In 1990, while on a lecture tour in the United Kingdom, TRADOC commander General John W. Foss told his audiences that "we like to say that the best Soviet motorized rifle regiment is located in the California desert."³⁷ Foss's reference was to the dreaded opposing force (OPFOR) at the National Training Center, a superbly trained and highly motivated unit skilled in the tactics of the former Soviet army. The OPFOR provided much of the realism in training that was the goal of the NTC program. Since the early 1980s, the OPFOR program had matured, paralleling the development of Soviet tactical doctrine and the U.S. Army's experience with how soldiers learned.³⁸

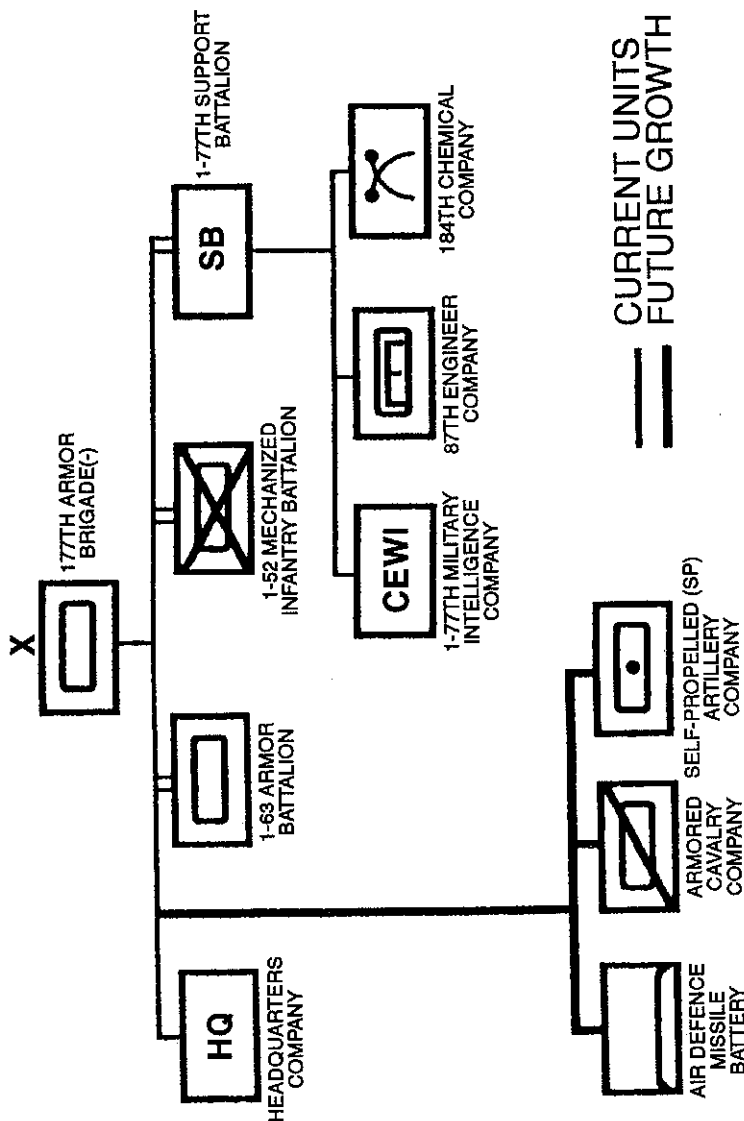
Prior to 21 January 1987, the OPFOR at the NTC was portrayed by the 6th Battalion, 31st Infantry (Mechanized) and the 1st Battalion, 73rd Armor. On that date, the 177th Armored Brigade was reactivated at Fort Irwin as a Heavy Separate Armored Brigade (Provisional), to serve as the opposing force for rotating BLUFOR units. The 177th had been organized on 27 August 1917 and had served in both the First and Second World Wars before being inactivated shortly after World War II. The unit included the 177th Headquarters and Headquarters Company; 1st Battalion, 52d Infantry (Mechanized); 1st Battalion, 63rd Armor; 87th Engineer Company; 177th Military Intelligence Company; 164th Chemical Company; C Company, 159th Aviation Battalion; and the 177th Forward Support Battalion (Chart 3). The 177th portrayed the 32d Guards Motorized Rifle Regiment of the 60th Motorized Rifle Division. The term "guards" was a term used by the former Soviet Union which denoted a unit that was honored for distinguishing itself during the "Great Patriotic War" (World War II).³⁹

37. General John W. Foss, Kermit Roosevelt Lecture Series, 1990, p. 21.

38. During the Persian Gulf War, the OPFOR added a hybrid "Sumaran" doctrine reflecting that of some Middle Eastern countries.

39. The 1st Battalion, 52d Infantry was organized 16 Jun 1917. The unit was organized with a headquarters and headquarters company, an antitank company, and four infantry companies. The 1st Battalion, 63rd Armor was organized 15 Aug 1942; the unit's commanders included General Creighton W. Abrams, Jr., later Chief of Staff of the Army. The latter unit was the first tank battalion to deploy to the new NTC. It was organized with a headquarters and headquarters company and four tank companies. Briefing, HQ 177th Brigade, 10 ay 1990, Fort Irwin, Calif., subj: OPFOR Information Brief.

Chart 3
177th Armored Brigade Organization



Source: NTC Visitors' Book, April 1994, Rotation 94-07.



To complete their "bad guys" image, OPFOR soldiers wore specially designed uniforms which featured dark green fatigues, black berets, and an insignia of a red star in a red circle.

During rotations, the two maneuver battalions took turns at command. The infantry battalion was in charge of odd-numbered rotations, and the tank battalion had command of the regiment during even-numbered rotations.⁴⁰ Personnel who served in the OPFOR units were not hand-picked, but came from the Army at large. That fact notwithstanding, the OPFOR's winning ways had led to a popular misconception, especially among losing BLUFOR commanders, that OPFOR soldiers were specially chosen.⁴¹

40. Maj. Beacon, interview with Capt Hampton of the OPFOR, NTC Operations Group, NTC Observations Division.

41. OPFOR Visitors' Book, n.d. The Forward Support Battalion was organized provisionally on 30 October 1987, and added to the Army's rolls on 6 October 1991.

To provide as realistic an environment as possible, The OPFOR were numerically superior to the BLUFOR. In fact, the 1st Battalion, 52d Infantry was the largest tank-equipped battalion in the U.S. Army. Approximately 1,500 OPFOR soldiers were permanently stationed at Fort Irwin, most for four-year tours. During each rotation, regular OPFOR soldiers were joined by about 500 "augmentees." Normally three infantry companies and an engineer company came to Fort Irwin on a temporary basis to become part of the opposing force and ensure it had the required combat power to realistically oppose the BLUFOR. Infantry companies were used as augmentees because the two OPFOR battalions consisting of U.S. Army armored and mechanized infantry battalions lacked dismounted infantry. In its first three years of operation, the OPFOR had neither dismounted infantry nor engineers. The companies, which volunteered for OPFOR duty, came variously from the active and reserve components of the regular army, the Army National Guard, and the U.S. Marine Corps. The NTC had also had during one rotation a company from the Scottish Highlanders of the British Army and during another rotation one from the Princess Patricia Light Infantry of the Canadian Army, to serve with the dedicated OPFOR.⁴²

In the NTC's first years, the OPFOR were trained to look, think, and act like Soviet soldiers at the U.S. Army Opposing Forces "Red Thrust" Training Detachment at Fort Hood, Tex. In July 1984, an OPFOR Academy was organized at Fort Irwin by the Third Colonel of the Regiment, Colonel Jerrell E. Hamby.⁴³ The NTC's mission was expanding from 10 rotations to 12 rotations annually, and the OPFOR needed a new facility to train newly assigned personnel. In addition, the initial personnel trained at Fort Hood were soon to be leaving, and Hamby feared the turnover of qualified and experienced personnel would dilute the quality of the regiment. He instituted a cadre of qualified OPFOR officers and noncommissioned officers to maintain and develop the standards of the OPFOR as originally taught by Red Thrust. In August 1988, the 177th Armored Brigade officially assumed the Red Thrust mission from Fort Hood. Over the years since its inception, the OPFOR Academy's mission had evolved. The school had originally been designed to train only newly assigned soldiers and junior officers in the basic fundamentals necessary for a smooth transition into the ranks of the OPFOR. With the addition of augmentation units, and the

42. (1) Briefing, Brig Gen William G. Carter, NTC Commander, 10 Feb 92. (2) Fact Sheet, FORSCOM, [1985], subj: OPFOR Augmentation.

43. At the time of this writing, an award commemorating the late Colonel Hamby was much coveted by NTC permanent party military personnel.

inherent dangers of training at the NTC, the mission was expanded to include the visiting OPFOR.⁴⁴

The OPFOR Academy offered two different programs of instruction. The 14- to 16-day Soldiers Course for privates through staff sergeants featured classroom, field, and pre-combat lifesaving instruction. Classroom instruction focused on familiarizing the students with the NTC and with the weapons they would use as OPFOR soldiers. During the field phase of the course, students tested their skills while "riding with the regiment." New OPFOR soldiers had also to learn how to safely operate and maintain the visually modified vehicles with which few were familiar. The 5-day Leaders Program emphasized instruction in Soviet doctrine and threat tactics for platoon sergeants through captains. The surrogate Soviet soldiers learned doctrine that stressed fast-moving, massive armored assault to overwhelm the enemy and gain both the military and psychological advantage. The Academy also taught a Red Thrust Leaders Course designed to teach leaders of FORSCOM units how to set up and run an OPFOR program.⁴⁵

By 1991, with the warming of relations between the new Russian and the American governments, the dissolution of the Warsaw Pact, and the shifting of NATO's focus from the traditional Soviet threat, the OPFOR program had reached a crossroads. What kind of force should the opposing forces replicate in the future? What should be their doctrine, their equipment, their organization?⁴⁶ If Soviet-based doctrine was no longer suitable, should doctrine developers look to a comprehensive nonpolitically sensitive, or generic doctrine? Perhaps Soviet doctrine was still suitable, given that many potential enemies had adopted some Soviet doctrine and owned Soviet equipment. What about the U.S. Army's own AirLand Battle doctrine? That approach might help to reveal the strengths and weaknesses in our own doctrine, but should Blue Force units fight against their own doctrine? That approach brought up the question of equipment. Airland Battle doctrine was dependent on the force modernization that had occurred over the past decade. Should the OPFOR have the same M-1 series tanks and Bradley Fighting Vehicles as the BLUFOR?⁴⁷

44. SFC Richard M. Cooke, "Red Thrust OPFOR Academy," *Red Thrust Star*, May 1989. pp. 25-26.

45. *Ibid.* p. 26.

46. Doctrine for the OPFOR was developed by the Threats Directorate at the Combined Arms Center at Fort Leavenworth, Kan.; the TRADOC Operations Group at Fort Irwin wrote the scenarios.

47. This discussion of OPFOR doctrine and the scenarios that would depend on it, is based on an article by Col Patrick O'Neal, then commander of the 177th Armored Brigade. "The Anvil: How Will OPFOR Portray A Generic Threat?," *Army*, December 1991, pp. 10-12.

Perhaps a generic doctrine would fit the bill. That approach, by implication, would mean that it would be an inferior doctrine, if U.S. forces continued to believe that AirLand Battle Doctrine was superior to any other. Testing of such a doctrine raised other questions. What would be the criteria? In addition, what sources could be used to make revisions. One suggestion was that the OPFOR use, as did many Third World nations, a combination of Soviet and British doctrine. Coincidentally, just before Saddam Hussein's Iraqi army invaded Kuwait in early August 1990, the NTC began development of a "Sumaran" doctrine which reflected the multiple-source battle doctrines of Middle Eastern countries. The effort to provide an alternative to "pure" Soviet doctrine was a response both to the decline of the Soviet threat and the rising specter of third world aggressors impinging on American interests.

As developed by representatives of the NTC TRADOC Operations Group and the 177th Armored Brigade (OPFOR), the Sumaran Army portrayed a generic threat based on a synthesis of equipment available in the region and the methods used by Middle Eastern countries in combat. Many of the tactical principles involved were British or Soviet in derivation. The Sumaran tactics, as replicated by the OPFOR, were based on a reorientation of intelligence, an Iraqi-style "trenchline" defense, and a focus on the infantry fight. They also included a complex obstacle system and counter-mine equipment and training. After the Iraqi invasion of Kuwait, Col. Patrick O'Neal, then NTC OPFOR commander, and Brig. Gen. James L. Wilson, commander of the NTC Operations Group, visited Saudi Arabia to observe the effects of NTC training on operations there. Both men told reporters for *Janes Defense Weekly* that the Sumaran doctrine "solidly reflects Iraqi battle techniques."⁴⁸

Operations Desert Shield and Desert Storm notwithstanding, the central threat portrayed by the NTC opposing force remained Soviet doctrine until late in 1993. The NTC did make a concession to the lessening of tensions with the Soviet Union by billing the OPFOR a "Soviet-style" regiment in its claim to be the "finest Soviet motorized rifle regiment in the world."⁴⁹ On some occasions, regional scenarios—Cuban, Latin American, Northeast Asian, North Korean, Middle Eastern—were adopted to meet the needs of rotating units. OPFOR commander O'Neal, said of his troops:

If today we were asked to represent some specific nation's force, if you give me their doctrine, a description of their

48. (1) Ibid. (2) NTC Special Text 91-1, Order of Battle and Organization for the Sumaran Army, 7 Feb 91, Preface. (3) NTC Special Text 91-2, Doctrine and Tactics, 7 Feb 91. (4) J. R. Wilson, "Training to Fight in the Desert," *Janes Defense Weekly*, International Edition, 23 Feb 91, V. 15 No. 8, pp. 257-61.

49. Clark interview, Romjue and Chapman, 8 Jul 92.

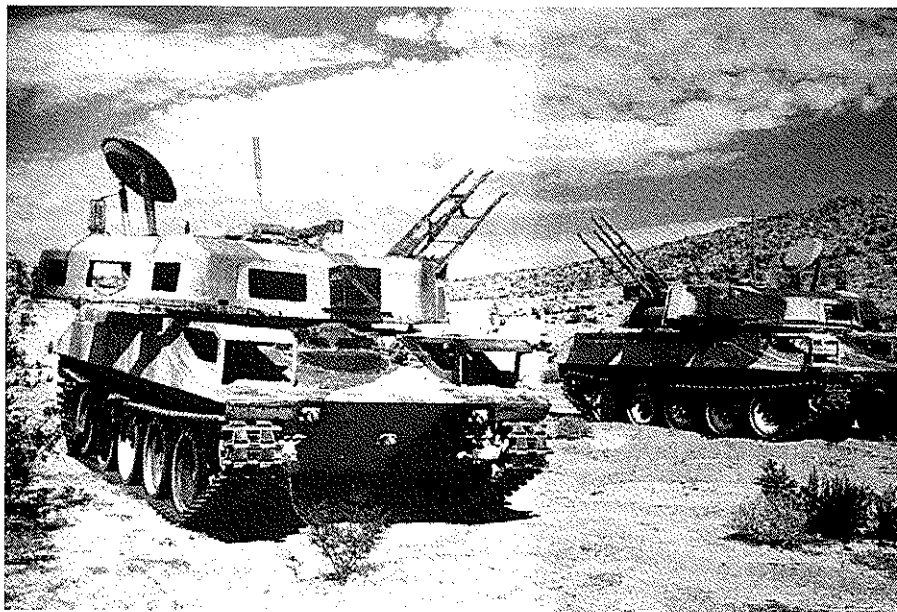
types of equipment and their tactics, we will recast the force we put out on the battlefield to be that army. . . . we're capable of becoming any army you want us to be in about two months.⁵⁰

Until 1993, the questions regarding the OPFOR scenarios remained generally unanswered. During that year, the Combined Arms Command began development of a new OPFOR model based on two packages: one for a heavy OPFOR and one for a light OPFOR. The new model was developed to provide a flexible training threat that could be tailored to represent a wide range of potential threat capabilities and organizations. Each OPFOR package would contain three documents: an organization guide, an operations handbook, and a tactics handbook. In September 1993, CAC published the first two books—CAC and Fort Leavenworth Pamphlets 350-1, Heavy Opposing Force (OPFOR) Organization Guide, and 350-2, Light Opposing Forces (OPFOR) Organization Guide. The capabilities-based OPFOR model introduced two major changes from past practice. First, while the heavy and light OPFOR packages were based on the organization and doctrine of foreign armies, they were not handbooks on the forces of any particular nation as were those of the existing NTC OPFOR. The new model featured composites that were constructed to provide a wide range of capabilities. Second, the new model was not associated with a fixed order of battle, but rather with "building blocks" from which a variety of potential orders of battle could be derived. The packages for both the heavy and light opposing forces were designed to accommodate the existing OPFOR units with relatively minor changes and to provide the flexibility to adapt to the changing training requirements of a force projection army. The principal issue, however, remained the same: to provide hard, tough, and credible opposition for the BLUFOR.⁵¹

Opposing Forces vehicles were the 17-ton Vietnam-era M551 Sheridan armored reconnaissance vehicles that were visually modified (VISMOD) with fiberglass panels to resemble Soviet BMP-1 or BMP-2 armored infantry fighting vehicles, T-72 and T-80 main battle tanks, 2S1 122-mm. self-propelled howitzers, 2S6 air defense systems, and the ZSU-23-4 four-barrel anti-aircraft guns. (Chart 4 and Table 1). In addition, a few M113 APCs were VISMOD to replicate BMPs. On the battlefield the

50. Janes, 23 Sep 91.

51. Col. David Oberst, Capt. Darrell Connelly, and SFC Gary Clifford, "Capabilities-Based OPFOR, *Combat Training Center Bulletin*, No. 94-1, March 1994, p. 32.



Two views showing the M551 Sheridan tank modified to replicate the Soviet ZSU-23-4 self-propelled antiaircraft gun system. Turret modifications were extensive.

infantry battalion fought with approximately 120 of the VISMOD BMP-1s. The BMP had an AT-3 Sagger antitank missile, a 73-mm. smooth bore gun, and a 7.62 coaxial machine gun. The armor battalion was equipped with the surrogate T-72 which featured a 125-mm. main gun, a 7.62 coaxial machine gun and a 12.7-mm. NSV anti-aircraft gun.⁵² There were about forty of the OPFOR T-72s at the NTC. The armor battalion used its mortar platoon to field an air defense battery equipped with surrogate ZSU-23-4s.⁵³

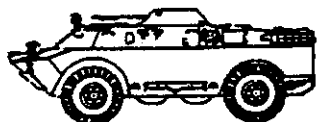


A few of the M551 Sheridan tanks were visually modified to resemble the Soviet 2S1 self-propelled 122-mm. howitzer.

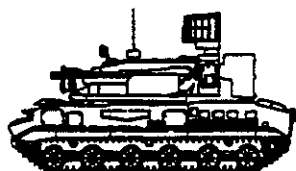
52. The 177th Armored Brigade was a deployable unit. If deployed on a wartime mission, the tank battalion would be equipped with M-1 series tanks and the infantry battalion with M113 armored personnel carriers. During Operations Desert Shield and Desert Storm, the only NTC unit to deploy was the 82d Quartermaster detachment of the 177th Support Battalion. In accordance with the FORSCOM Mobilization and Deployment Planning System, in the event of full mobilization, the NTC would be closed. U.S. Army Forces Command ODCSOPS, USAFORCOM FORMDEPS, Vol. 1, System Description (Washington, DC: U.S. Government Printing Office, 1986, p. A-2).

53. Briefing, Headquarters 177th Brigade, 10 May 1990, Fort Irwin, Calif. subj: OPFOR Information Brief.

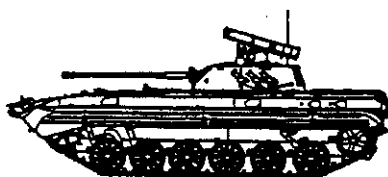
Chart 4
National Training Center OPFOR M551 VISMODOs



BRMD-2



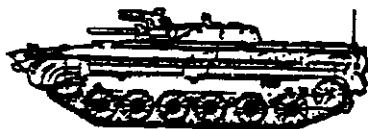
2S6



BMP-2



T-72



BMP-1



T-80

Source: Visitors' Notebook, Advanced Warfighting Experiment, April 1994.

Table 1
Soviet Weapon Systems and Equipment Replicated at NTC

<u>EQUIPMENT</u>	<u>QTY</u>	<u>SIMULATOR</u>
IR SAM (SA-9)	2	HMMWV (NO RADAR)
RF SAM (SA-8)	1	HMMWV (RADAR EMISSION)
ZSU-23.4	2	HMMWV (RADAR EMISSION)
C-3	1	HMMWV (RADAR EMISSION)
2S6	4	VISM0D M551 (NO RADAR)
SA-14	8	STINGER (HMMWV CARRIED)
T-80	11	VISM0D M551
T-72	34	VISM0D M551
BMP-2	3	2-OSV; 1-VISM0D M551
BMP-1P	31	VISM0D M551 (NO TROOP CAPACITY)
BMP-1	104	VISM0D M551 (NO TROOP CAPACITY)
BMP-1	23	VISM0D M113 (NO OFFENSIVE CAPABLE)
BRDM-2	44	VISM0D HMMWV
BRDM-2 W/AT-5	9	VISM0D HMMWV
BRDM RKH	3	VISM0D HMMWV
BRDM TDA-M	4	VISM0D HMMWV
MT-12, 100MM GUN	6	VISUAL MOCKUP
2S1, 122MM SP HOW	6	VISM0D M551
PZM-2	3	SEE
IMR	3	CEV
MTK-2	2	ACE
MDK-3	4	D-7
BAT-2	7	ACE
MTU-MT-55	2	AVLB
R-330P	1	OTSA SIMULATOR
R-834P	1	OTSA SIMULATOR
DF	1	PRD-11
JAMMER	4	OG-181 JAMMER
TALL MIKE RADAR	3	VISM0D HMMWV W/PPS-5
MI-24 HIND	4	VISM0D UH-1

Source: Visitors' Notebook, Advanced Warfighting Experiment, April 1994.

During FY 1984, the NTC brought in four UH-1M helicopters to replicate the Soviet HIND-D. Before the UH-1Ms could be visually modified, two of them were involved in accidents. As a result they were replaced by older UH-1H Hueys. As with the M551 VISMODOs, the Huey had fiberglass additions. It did not look exactly like its Soviet counterpart, but it was different enough so that it was readily distinguishable from BLUFOR aircraft. The surrogate HIND-D was equipped with MILES and could be killed by ground systems or air defense systems. The HIND could also be tracked by exercise observers. Plans were eventually to replace the Hueys with VISMODO AH-1 Cobras.⁵⁴



UH-1 Huey helicopters were modified to portray Soviet HIND-D gunships in support of OPFOR missions during training rotations.

54. Ibid.



Soviet 122-mm. self-propelled howitzer (Vismoded Sheridan) deploys.

Another OPFOR vehicle replicated the Soviet BRDM. In the beginning, the BRDM was portrayed by Army-model Dodge pickup trucks altered to represent the wheeled, lightly armored reconnaissance vehicle. When the NTC was able to procure HMMWVs in the early 1980s, the M998 basic version became the surrogate BRDM. When asked to identify the VISMODO HMMWV, a member of the Operations Group dubbed it "a HMMWV with a nose job." Besides those fake Soviet vehicles, the OPFOR also employed some real Soviet MTLBs, lightly armored, tracked and wheeled personnel carriers, captured by Israeli forces in the Middle East conflicts.⁵⁵

55. (1) Chapman, *NTC*, Vol I, pp. 86-87. (2) Quirin G. Johnson, "They All Hate the Bad Guys of NTC's Mojave," *Army*, June 1987, pp. 42-49.

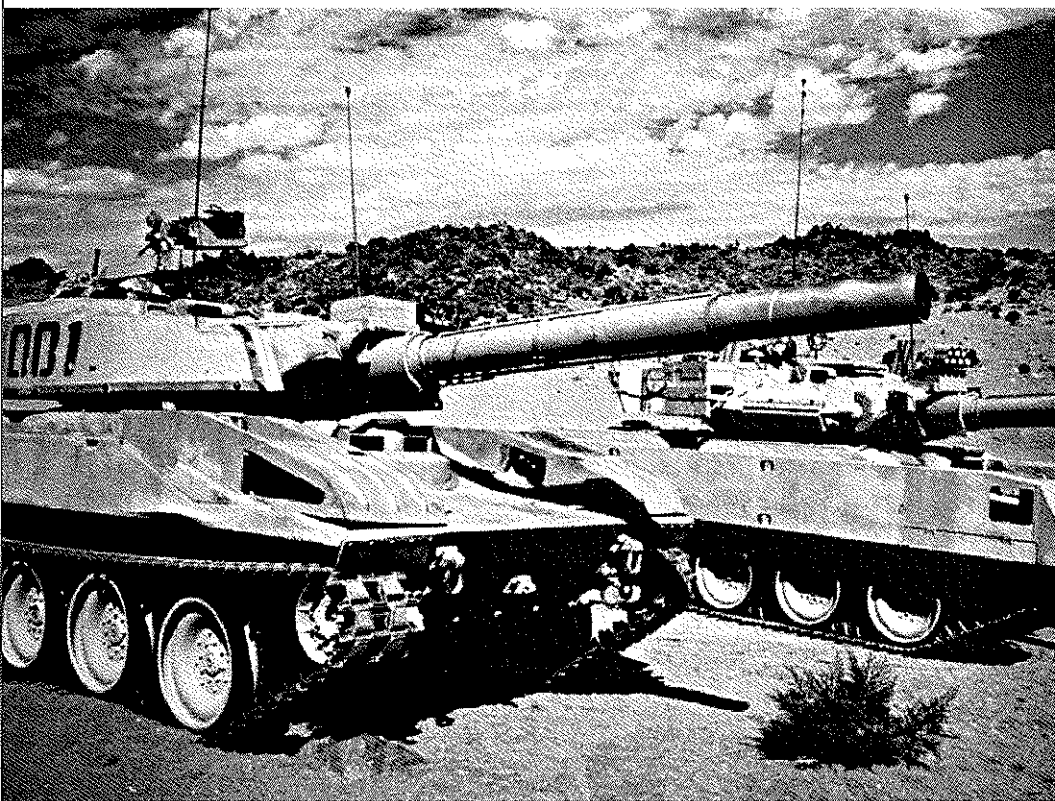
Despite the constant quest for realism, the NTC OPFOR were not exactly like the Soviet force they replicated. In the first place, a Soviet motorized rifle regiment in the late 1980s would field about 270 vehicles and 2,500 men, at full strength. In addition, by that time the OPFOR was about six years behind the modernization of the Soviet Army. For example, the Soviets had modernized their BMP units with BMP-2s which had a better antitank weapon system, an improved turret, and an upgraded engine. The Soviet T-72s had been replaced with T-80 tanks with enhanced frontal and side armor protection, grenade launchers, and more engine power. By the early 1990s, the NTC had only a few M551s visually modified as T-80s. Even more basic than the differences in equipment was the fact that every OPFOR soldier spoke English. In Europe translators would have been required. Perhaps most important of all, the real BMP could carry a



A real Soviet weapons system, the MT-LB was put into Soviet military service in the late 1960s. As with the American-built M113 APC, the MT-LB served a number of different functions.

squad of eight soldiers; the M551 could not carry troops, having only room for a four-man crew. Nor could the M551 mount engineer equipment. Despite those shortcomings, the OPFOR prevailed in approximately 90 percent of NTC battles.⁵⁶

In 1989, the aforementioned problems, and others, with the M551 fleet of OPFOR vehicles led the Army to initiate a program to replace the Sheridan tanks at the NTC. The first production models of the M551 had been fielded in 1966. Production had been completed in 1970 after manufacture of 1,700 vehicles. Thus, some of the OPFOR vehicles were nearly thirty years old; they were very expensive to maintain, and spare parts were nonexistent or in very short supply. The U.S. Army had, in any case, never



In the early 1990s, plans were being made to replace the aging T-72 VISMODOs (back) with T-80 VISMODOs (front) to reflect a more current OPFOR threat.

56. (1) Briefing, 177th Armored Brigade, 10 May 90. (2) Johnson, "Bad Guys," p. 42.

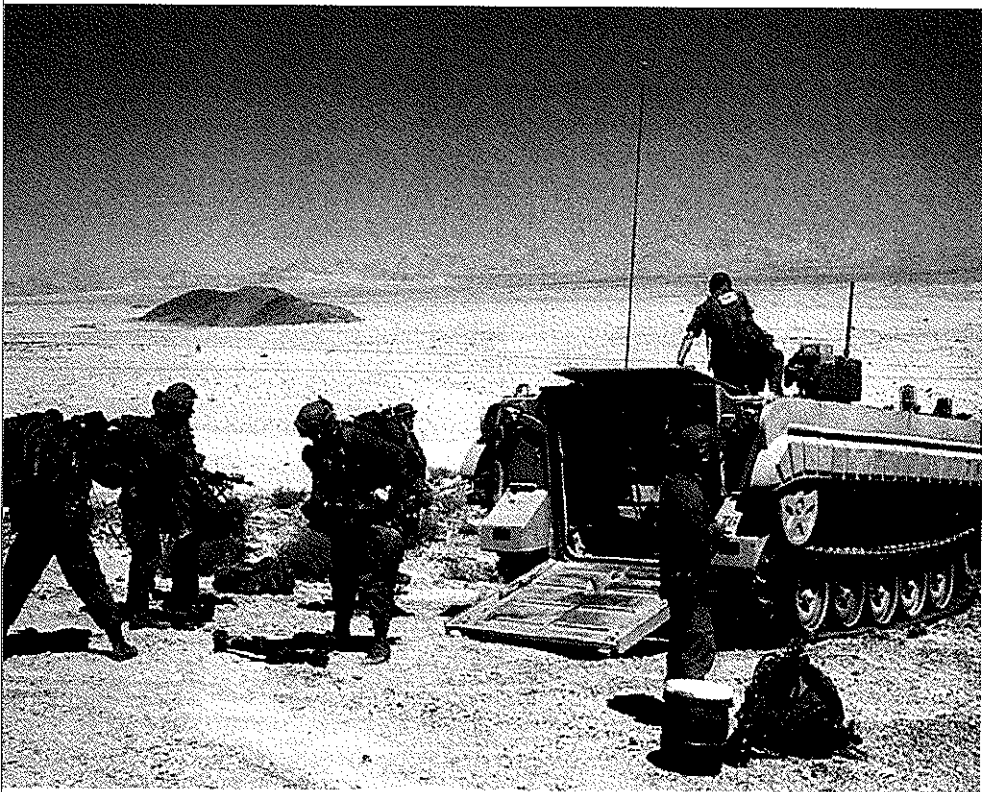
considered the Sheridan one of its better tanks and had long ago given up efforts to improve it. As time went by, more and more of the tanks had to be "cannibalized" to keep others running. By 1989, with the exception of the NTC OPFOR, only the 82d Airborne Division still used the aging M551s, because of the perceived need to supply the parachute-landed division with limited tank capability.⁵⁷

Throughout 1989 the Army Materiel Command, in concert with the U.S. Army Training Support Center (ATSC), the Combined Arms Training Activity, the Army Tank-Automotive Command, the intelligence community, and several other agencies, considered alternatives for replacing the M551 with newer and less expensive OPFOR surrogate vehicles (OSV). Although the need for a new fleet of vehicles had received the support of the Vice Chief of Staff of the Army, debate continued as to the exact type of vehicles that ought to serve in that capacity. At that time, virtually the entire Army leadership agreed that a wheeled vehicle should be the solution, if it could provide the mobility necessary. Fiscal reality determined that conclusion: the costs of operating a tracked vehicle were high compared with those of operating a wheeled vehicle. As a result, the ATSC was ready to begin testing light armored wheeled vehicles pending the final approval of General Carl E. Vuono, Chief of Staff of the Army, and adequate funding.⁵⁸

Then on 12 April 1990, as a result of the Conventional Forces in Europe (CFE) negotiations, the Army announced that more than 1,200 M113 armored personnel carriers would be returned from Europe to the United States. The Department of the Army designated 207 of them as OPFOR surrogate vehicles and shipped the M113s to Red River Army Depot, Texas, to be visually modified. That solution seemed preferable to scrapping or selling off fleets into an already overloaded market. The Threats Directorate at CATA and the Project Manager for Training Devices (PM TRADE), working with the depot, developed a design and figured costs. Each modified vehicle would cost \$165,000, as compared to the \$600,000 to \$1 million for each new wheeled vehicle. When the plan was presented to Maj. Gen. Jerome H. Granrud, the Army Staff Assistant Chief of Staff for Force Development, on 23 May 1990, the project was killed for lack of funds. At that point, the Combined Arms Center began investigating the possible

57. (1) Ripley, pp. 48-49. (2) Briefing, 177th Armored Brigade, 10 May 90. The 82d Airborne's M551s were the first tanks to arrive in Saudi Arabia during Operations Desert Shield and Desert Storm. They were also employed in the destruction of General Manuel Noriega's headquarters in Panama in December 1989.

58. TRADOC Annual Historical Review, CY 1989, pp.203-04.



This OPFOR M113 was visually modified as a mock-up Soviet BMP. Unlike the M551 VISMODOs, the VISMODO M113s could transport infantry.

purchase of East German equipment. Most of it proved reliable, but not maintainable. Finally, in February and March 1991, CAC revived the M113 plan to focus only on the BMP-2—rather than on the BMP-2, the T-80 tank, and the surrogate artillery and air defense systems—and revived the program with Red River Army Depot to build and test prototypes which would be funded with CAC funds. Meanwhile, NTC officials complained that the developers planned to use the M113A2 version of the system, which, it was believed, was slower than the M551. When the Army Chief of Staff was briefed, he agreed the M113A3 would be better. The first M113-based prototype rolled off the production line in July 1991.⁵⁹

59. Briefing slides, CAC Threats Directorate, The M113/BMP-2 OPFOR Surrogate Vehicle Program, 7 Jul 91.

According to plan, the NTC would receive 159 of the M113-based BMP-2s, with 30 in reserve. Red River Depot converted the armored personnel carrier into an OSV by adding a rear extension with external fuel tanks and an extended crew compartment; front- and side-mounted extensions constructed from heavy aluminum plate to replicate the BMP's shape; a turret based on M2 Bradley subassemblies; and a laser engagement system to simulate the Soviet vehicle's 73-mm. cannon, 7.62 co-axial machine gun, and AT-5 missile. The prototype also had a smoke grenade launcher, five sets of road wheels, and could accommodate six troops in addition to the three-man crew. In addition, its drivetrain had been converted to that of the M113A3. While the older M551 Sheridan had an operating cost of \$157.40 per mile, the new OSV could be operated at \$14.50 per mile. Those figures represented an annual savings per vehicle of \$538,000, while the cost of converting the APC into an OSV was only \$370,000. Despite those favorable numbers, the OPFOR surrogate vehicle effort went unfunded until late



These M551 tanks, visually modified to resemble BMP-1s and T-72s, were the OPFOR's major weapons systems. Plans were to replace them with BMP-2 and T-80 VISMOSDs.

1993, at which time it was only partially funded. Nevertheless, the NTC stopped work on a project to upgrade the Sheridan to a Soviet T-80 tank configuration.⁶⁰

How good were the NTC "bad guys" as the training center matured and took on additional missions? How did the BLUFOR see their "enemy"? How did the OPFOR soldiers see themselves? In an interview with *Soldiers* magazine, a command sergeant major and OPFOR soldier remarked:

If I were a Soviet NCO, I'd want to come here and train with the OPFOR. After that, I'd go back to my regular unit and try to get my soldiers to do it as well as we do it here. . . . The soldiers you'll see here are good. They take a lot of pride in what they do. They go out and give 150 percent every day of the week.⁶¹

Another OPFOR soldier, described by a friend as the "baddest tank killer in the whole damned company," regretted only not having the chance to fight against his own unit as a member of the BLUFOR. In a like vein, a tanker in the OPFOR armor battalion asked "How many other guys get to train and fight as Soviets against American soldiers?"⁶²

Two NTC commanders shared their thoughts on the OPFOR during interviews. Brig. Gen. Paul E. Funk, NTC commander, September 1988 through October 1989, summed up what was for him the essence of the OPFOR:

The soldiers who have been here have an incredible feeling of satisfaction at having been here. Not that they won every fight because no one ever has. . . . Not that every soldier has won, but he's been a winner because he came here and fought against a very tough enemy. . . . He knows he went up against a big league opponent. One of the guys around here said it best one time. I asked him if we ought to scale back the standards and make the OPFOR more

60. (1) "M113 converted to BMP-2 surrogate," *International Defence Review*, 1 Dec 92. (2) TRADOC Annual Command History, CY 1991, pp. 163-64. (3) Fact Sheet ATZL-CST-T, CAC Threat Directorate, 14 Mar 91. The real BMP could accommodate seven troops in addition to the crew. It also had six sets of road wheels rather than five.

61. Sgt. Dave Schad, "Reckoning Force," *Soldiers*, January 1987, p. 16.

62. Schad, pp. 18, 19.

vulnerable and he said "Hey General, we didn't come out here to spar with a wimp."⁶³

Brig. Gen. Wesley K. Clark, Funk's successor as NTC commander, and former Chief of the NTC Operations Group, said of the OPFOR:

He must be good enough so that BLUEFOR can't make major mistakes and win. Otherwise, you can't take the lessons from NTC and apply them with any confidence in war. If you win because the OPFOR can't cross the LD [line of departure], if you win because the OPFOR can't use artillery, if you win because the OPFOR maneuvers poorly or loses command and control, you don't know whether your victory is meaningful. In war we would be happy to take victories like that.⁶⁴

Not everyone was that admiring, or as happy about losing. A battalion commander of the 101st Airborne Division remarked that "We'll never run into a force this brave. A MILES death is an easy death; you come back to life." But an OPFOR armor S-3 at the NTC took a different view:

The thing that has gotten tougher is that the NTC experience factor has finally come to the Army. . . . There's that tank commander for Delta 66 over in BLUFOR land, who was an OPFOR tanker two years ago. We're starting to pay for how well trained we are, because those guys are starting to come back here . . . to rip us up a little bit.⁶⁵

Perhaps the best evidence of the effectiveness of the NTC's opposing force was that, according to many returning Desert Storm veterans who were also NTC veterans, war in the Iraqi and Kuwaiti desert was much like the NTC except that the Iraqis were not as good as the OPFOR. When Army Chief of Staff General Carl E. Vuono asked a troop commander who

63. Interview, Maj Jeff Marrin, Deputy Chief of the NTC Observation Division, with General Funk, Fall 1989.

64. Interview, Capt. Ferdinand Irizarry, Operations Officer, NTC Observation Division with Brig. Gen. Clark, September 1991. Clark served as chief of the Operations Group from September 1984 through April 1986; he was NTC commander from Oct 1989 through September 1991.

65. Maj. Beacon, Interview with Maj. Pattis, NTC Operations Group, NTC Observations Division, 6 April 1990.

had participated in the Battle of 73 Easting in Iraq during the Gulf War, "How do you explain your great success in your first battle?" the officer replied:

Sir, this was not our first battle. This was our fifteenth battle! We fought three wars at the National Training Center . . . Yes Sir, we had been 'shot at' before. Many times. This war was just like our training.⁶⁶



Visually modified M551 Sheridan tanks served as T-72 Soviet vehicles for the NTC OPFOR.

66. Maj. John F. Antal, "OPFOR: Prerequisite for Victory," AUSA Landpower Essay Series, May 1993. Maj Antal heard the exchange during the 1992 Armor Conference at Fort Knox, Ky.

MILES and the Problem of Indirect Fire

At the heart of NTC training exercises was the aforementioned laser engagement system in use at the NTC and always known as MILES (Multiple Integrated Laser Engagement System). A problem when training soldiers for combat had always been making the situation seem real. Until MILES, Army training had been of the "bang, you're dead, no, I shot you first" variety. It was left for umpires with clipboards and rule books to estimate casualties. What they did not see or count and what they did see and record was usually arguable. As a sophisticated training device, MILES made it possible for soldiers to "shoot" and "be shot" using an eye-safe laser device. Thus much of the subjectivity of assessing casualties was eliminated. The MILES also allowed the instrumentation system to record "near misses, hits, and kills," that could be used later to analyze unit strengths and weaknesses during a given battle.

To record firing events, individual soldiers forward of the battalion rear boundary wore laser receptor gear on shoulder harnesses and on their helmets. Small microphones on small arms, such as an M16 rifle, "listened" for the noise of a blank round and would not fire without a blank round. MILES firing devices on the barrels of rifles and machine guns sent out pulses of laser energy that, if on target, would strike the target's detector devices. Microchips in the detector system filled in for kill probability tables by determining what type of weapon beam was required to kill the target. An intermittent beeping from the detector indicated a soldier was being "near missed." A soldier was "dead" when the detector emitted a continuous beeping. A "dead" soldier was required to remove his helmet, seek safe ground, sit down, and take no more part in the engagement.

Vehicles such as tanks and fighting vehicles wore detector belts that recorded hits. A vehicle was considered destroyed or damaged when a yellow strobe light mounted on its top surface was activated. Audio and visual indications were also provided inside the vehicle to alert the crew to a hit and identify the firer. Each vehicle was issued a color-coded placard prior to every battle indicating a damaged or destroyed status if hit. Only an exercise controller with a special key could reset the detectors to "play" again. The helicopter MILES included pyrotechnic devices to signify firings and a smoke package that detonated when the helicopter was killed.⁶⁷

67. (1) Cocks, p. 111. (2) Maj. Frank N. Roberts, "Logistics in Desert Operations: Lessons Learned From the National Training Center" (M.A. Thesis, Command and General Staff College, Fort Leavenworth, Kan., 1987), pp. 38-39. Maj. Roberts was assigned as a logistics O/C at the National Training Center, 1983-1984.

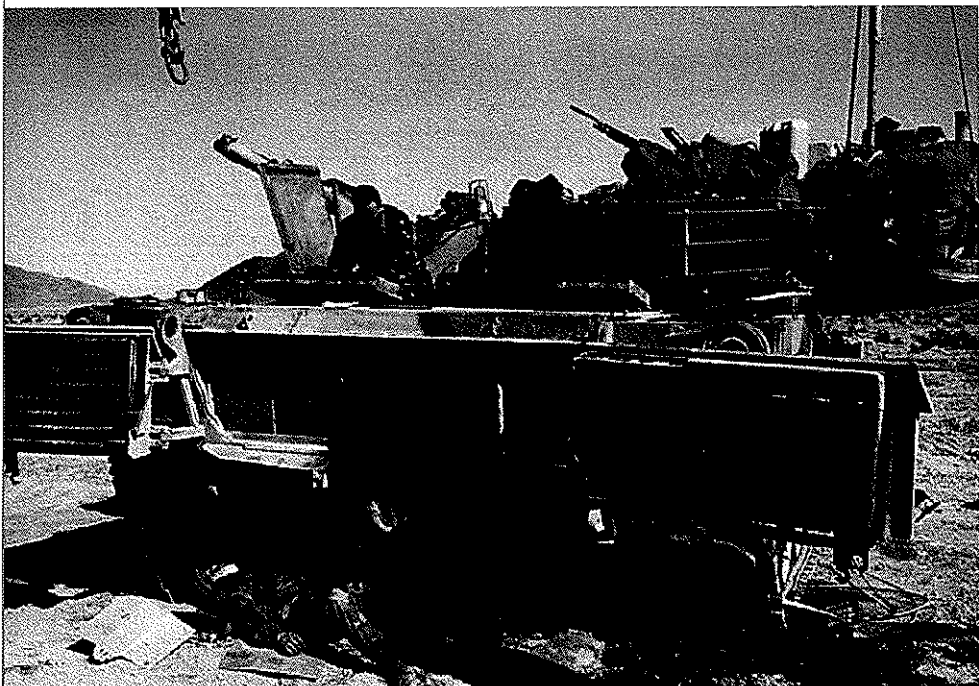


Laser detectors on individual soldiers' helmets and harnesses allowed the MILES system to record "near misses," "hits," or "kills" during NTC battles.



The "kill" light on the OPFOR 87th Engineer Company's turretless M113/ BMP VISM0D indicated a vehicle "hit" or "kill."

If a vehicle was designated as destroyed, all equipment and ammunition on board were considered unserviceable. Destroyed vehicles were also considered total losses, and the unit had to request a replacement from the battalion S-4. A dead vehicle had to stop in place, traverse the turret to the rear, and elevate the gun tube to indicate its status. In the case of "damaged" vehicles, a color-coded placard issued to the crew indicated items requiring replacement, the level of repair, and the total repair time based on maintenance allocation charts. If the vehicle could not be "fixed forward"—that is, on the site of the hit—the crew had to evacuate it, or have it towed, to the company or battalion trains (better known as the "bone yard") for simulated repair. Repair time began when all forms had been completed and mechanics were on site with the necessary repair tools and parts. When the predetermined repair time had elapsed, a controller released the vehicle to its unit. Mechanics were then released also, to perform "real world"



Repairing the M1 tank. Quick return to battle was imperative. If vehicles could not be repaired in the field or at a battalion support area, they were not replaced, and their crews could take no further part in the battle.

maintenance. It was the MILES system, then, that allowed for that sort of battle realism. Col. George Harmeyer, chief of the Operations Group during most of 1990 and 1991, summed up the role of MILES at the NTC: "MILES and the instrumentation system gave us a smoking gun, so if a commander makes a mistake, we can show it to him and go beyond the 'if' it happened to the 'why' it happened."⁶⁸

As the NTC began its fourth year of operations in late 1984, laser engagement systems were available for use on small arms, M60 tanks, armored personnel carriers, antitank missiles such as TOWs and Dragons, the Chaparral and Vulcan air defense systems, and the UH-1 Huey helicopter. At that time, none of the helicopters equipped with the MILES were linked into the central exercise control center. In addition, none of the U.S.

68. (1) ROE, pp. 2-6. (2) James Kitfield, "Desert Showdown," *Government Executive*, September 1992, p. 22.